INSTRUCTION MANUAL

HI 96771

Free Chlorine & Chlorine Ultra High Range ISM

HANNA instruments

www.hannainst.com

Dear Customer,

Thank you for choosing a Hanna product. This manual will provide you with the necessary information for the correct use of the instrument. Please read it carefully before using the meter. If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com.

Preliminary examination

Please examine this product carefully. Make sure that the instrument is not damaged. If any damage occured during shipment, please notify your Dealer.

Each **HI 96771** Ion Selective Meter is supplied complete with:

- Two Sample Cuvettes and Caps
- 9V Battery
- Instruction Manual

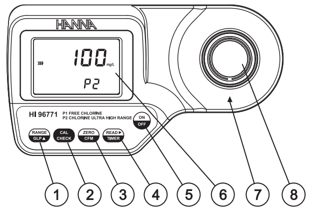
<u>Note</u>: save all packing material until you are sure that the instrument works correctly. Any defective item must be returned in its original packing.

For more details about spare parts and accessories see "Accessories".

Technical specifications:

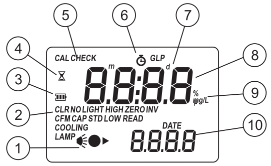
Range	0.00 to 5.00 mg/L for Chlorine LR 0 to 500 mg/L for Chlorine UHR
Resolution	0.01 mg/L from 0.00-3.50 mg/L; 0.10 mg/L above 3.50 mg/L for Chlorine LR 1 mg/L from 0 to 200 mg/L; 10 mg/L above 200 mg/L for Chlorine UHR
Accuracy	±0.03 mg/L ±3% of reading at 25°C for Chlorine LR ±3 mg/L ±3% of reading at 25°C for Chlorine UHR
Typical EMC Dev.	±0.01 mg/L for Chlorine LR ±1 mg/L for Chlorine UHR
Light Source	Tungsten lamp
Light Detector	Silicon Photocell with narrow band interference filter @ 525 nm
Method	Adaptation of Standard Methods for the Examination of Water and Wastewater, 20th edition, 4500-Cl.
Environment	0 to 50°C (32 to 122°F); max 95% RH non-condensing
Battery Type	1 x 9 volt
Auto-Shut off	After 10' of non-use in *measurement mode;* after 1 hour of non-use in *calibration mode;* with last reading reminder.
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")
Weight	360 g (12.7 oz.).

Functional description



1. **RANGE/GLP/▲** key: press to change the parameter. Press and hold for three seconds to enter *GLP mode*. In *calibration mode* press to edit the date and time.
2. **CAL CHECK** key: press to perform the validation of the meter, or press and hold for three seconds to enter *calibration mode*.
3. **ZERO/CFM** key: press to zero the meter prior to measurement, to confirm edited values or to confirm factory calibration restore.
4. **READ/►/TIMER** key: In *measurement mode*, press to make a measurement, or press and hold for three seconds to start a pre-programmed countdown prior to measurement. In *GLP mode* press to view the next screen.
5. **ON/OFF** key: to turn the meter on and off.
6. Liquid Crystal Display (LCD)
7. Cuvette alignment indicator
8. Cuvette holder

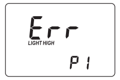
<u>DISPLAY ELEMENTS DESCRIPTION</u>



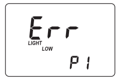
1. The measuring scheme (lamp, cuvette, detector), appears during different phases of zero or reading measurement
2. Error messages and warnings
3. The battery icon indicates the charge state of the battery
4. The hourglass appears when an internal check is in progress
5. Status messages
6. The chronometer appears when the reaction timer is running
7. The month, day and date icons appear when a date is displayed
8. Four digit main display
9. Measuring units
10. Four digit secondary display

Errors and warnings

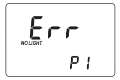
<u>ON ZERO READING</u>



Light High: There is too much light to perform a measurement. Please check the preparation of the zero cuvette.

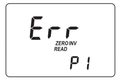


Light Low: There is not enough light to perform a measurement. Please check the preparation of the zero cuvette.



No Light: The instrument cannot adjust the light level. Please check that the sample does not contain any debris.

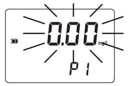
<u>ON SAMPLE READING</u>



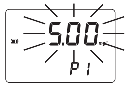
Inverted cuvettes: The sample and the zero cuvette are inverted.



Zero: A zero reading was not taken. Follow the instructions of the measurement procedure for zeroing the meter.

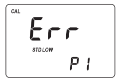


Under range: A blinking "**0.00**" indicates that the sample absorbs less light than the zero reference. Check the procedure and make sure you use the same cuvette for reference (zero) and measurement.

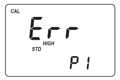


Over Range: A flashing value of the maximum concentration indicates an over range condition. The concentration of the sample is beyond the programmed range: dilute the sample and re-run the test.

<u>DURING CALIBRATION PROCEDURE</u>



Standard Low: The standard reading is less than expected.

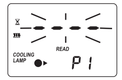


Standard High: The standard reading is higher than expected.

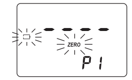
<u>OTHER ERRORS AND WARNINGS</u>



Cap error: Appears when external light enters in the analysis cell. Assure that the cuvette cap is present.



Cooling lamp: The instrument waits for the lamp to cool down.

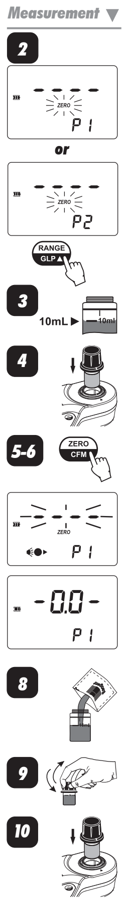


Battery low: The battery must be replaced soon.



Dead battery: This indicates that the battery is dead and must be replaced. Once this indication is displayed, normal operation of the instrument will be interrupted. Change the battery and restart the meter.

Measurement procedure



1• Turn the meter on by pressing **ON/OFF**.

2• When the beeper sounds briefly, the LCD displays dashes and "P1" (Chlorine Low Range) or "P2" (Chlorine Ultra High Range) the meter is ready. The code that appears on the secondary display is the one of the last selected parameter. If necessary, press **RANGE/GLP/▲** to change parameter. The blinking "**ZERO**" indicates that the instrument needs to be zeroed first.

3• Fill the cuvette with 10 mL of unreacted sample, up to the mark, and replace the cap.

4• Place the cuvette into the cuvette holder and ensure that the notch on the cap is positioned securely into the groove.

5• Press **ZERO/CFM** and the lamp, cuvette and detector icons will appear on the display, depending on the measurement phase.

6• After a few seconds the display will show "**-0.0-**". The meter is now zeroed and ready for measurement.

7• Remove the cuvette.

8• Add the content of the packets for the specific test reagents:
<u>Chlorine LR:</u> 1 packet of **HI 93701-0**
<u>Chlorine UHR:</u> 1 packet of **HI 95771A-0** and 1 packet of **HI 95771B-0**.

9• Replace the cap and shake gently for 20 seconds.

10• Replace the cuvette into the cuvette holder and ensure that the notch on the cap is positioned securely into the groove.

11• Press and hold **READ/►/TIMER** for three seconds. The display will show the countdown prior to measurement. The beeper is playing a beep at the end of countdown period.
Alternatively, wait for 1 minute and just press **READ/►/TIMER**.
In both cases the lamp, cuvette and detector icons will appear on the display, depending on the measurement phase.

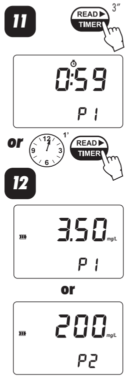
12• The instrument directly displays concentration in mg/L of free chlorine and the range number on the LCD.

INTERFERENCES FOR CHLORINE LR

- Positive error: Bromine, Oxidized Manganese and Chromium, Chlorine dioxide, Ozone and Iodine.
- Alkalinity above 250 mg/L $CaCO_3$ or acidity above 150 mg/L $CaCO_3$ will not reliably develop the full amount of color or it may rapidly fade. To resolve this, neutralize the sample with diluted HCl or NaOH.
- In case of water with hardness greater than 500 mg/L $CaCO_3$, shake the sample for approximately 2 minutes after adding the powder reagent.

INTERFERENCES FOR CHLORINE UHR

- Positive error: Bromine, Oxidized Manganese and Chromium, Chlorine dioxide, Ozone and Iodine.



Validation and Calibration procedures

Warning: do not validate or calibrate the instrument with standard solutions other than the Hanna CAL CHECK™ Standards, otherwise erroneous results will be obtained.

For accurate validation and calibration results, please perform tests at room temperature (18 to 25°C; 64.5 to 77.0°F).

i ***Use the Hanna CAL CHECK™ cuvettes (see "Accessories") to validate or calibrate instruments.***

VALIDATION

Validation

Note: The validation is performed only for the selected parameter. For full validation of the instrument, the following procedure must be performed for each parameter.

1• Turn the meter on by pressing ON/OFF.

2• When the beeper sounds briefly and the LCD displays dashes, the meter is ready.

3• Place the CAL CHECK™ Standard HI96771-11 Cuvette A into the cuvette holder and ensure that the notch on the cap is positioned securely into the groove.

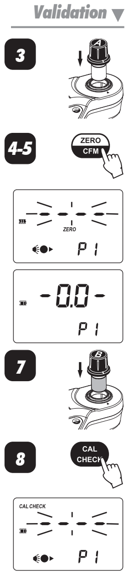
4• Press ZERO/CFM and the lamp, cuvette and detector icons will appear on the display, depending on the measurement phase.

5• After a few seconds the display will show "-0.0-". The meter is now zeroed and ready for validation.

6• Remove the cuvette.

7• Place the specific CAL CHECK™ Standard HI96771-11 Cuvette B into the cuvette holder, for and ensure that the notch on the cap is positioned securely into the groove.

8• Press CAL CHECK key and the lamp, cuvette and detector icons together with "CAL CHECK" will appear on the display, depending on the measurement phase.



9• At the end of the measurement the display will show the validation standard value. The reading should be within specifications as reported on the CAL CHECK™ Standard Certificate. If the value is found out of specifications, please check that the cuvettes are free of fingerprints, oil or dirt and repeat validation. If results are still found out of specifications then recalibrate the instrument.

CALIBRATION

Calibration

Note: It is possible to interrupt the calibration procedure at any time by pressing CAL CHECK or ON/OFF keys.

When calibrating, only the selected range is affected.

1• Turn the meter on by pressing ON/OFF.

2• When the beeper sounds briefly and the LCD displays dashes, the meter is ready.

3• To change the range, simply press RANGE/GLP/▲.

4• Press and hold CAL CHECK for three seconds to enter *calibration mode*. The display will show "CAL" during calibration procedure. The blinking "ZERO" asks for instrument zeroing.

5• Place the CAL CHECK™ Standard HI96771-11 Cuvette A into the cuvette holder and ensure that the notch on the cap is positioned securely into the groove.

6• Press ZERO/CFM and the lamp, cuvette and detector icons will appear on the display, depending on the measurement phase.

7• After a few seconds the display will show "-0.0-". The meter is now zeroed and ready for calibration. The blinking "READ" asks for reading calibration standard.

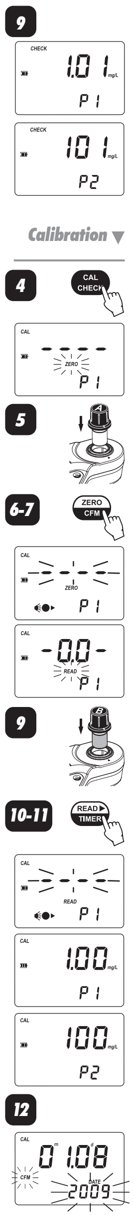
8• Remove the cuvette.

9• Place the specific CAL CHECK™ Standard HI96771-11 Cuvette B into the cuvette holder, for and ensure that the notch on the cap is positioned securely into the groove.

10• Press READ/►/TIMER and the lamp, cuvette and detector icons will appear on the display, depending on the measurement phase.

11• The instrument will show for three seconds the CAL CHECK™ standard value.

Note: If the display shows "STD HIGH", the standard value was too high. If the display shows "STD LOW", the standard value was too low. Verify that both CAL CHECK™ Standard HI96771-11 Cuvettes, A and B are free from fingerprints or dirt and that they are inserted correctly.



12• Then the date of last calibration (e.g.: "01.08.2009") appears on the display, or "01.01.2009" if the factory calibration was selected before. In both cases the year number is blinking, ready for date input.

13• Press RANGE/GLP/▲ to edit the desired year (2009-2099). If the key is kept pressed, the year number is automatically increased.

14• When the correct year has been set, press ZERO/CFM or READ/►/TIMER to confirm. Now the display will show the month blinking.

15• Press RANGE/GLP/▲ to edit the desired month (01-12). If the key is kept pressed, the month number is automatically increased.

16• When the correct month has been set, press ZERO/CFM or READ/►/TIMER to confirm. Now the display will show the day blinking.

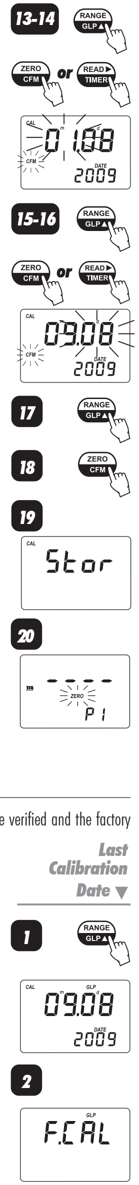
17• Press RANGE/GLP/▲ to edit the desired day (01-31). If the key is kept pressed, the day number is automatically increased.

Note: It is possible to change the editing from day to year and to month by pressing READ/►/TIMER.

18• Press ZERO/CFM to save the calibration date.

19• The instrument displays "Stor" for one second and the calibration is saved.

20• The instrument will return automatically to the measurement mode by displaying dashes on the LCD.



GLP

In the *GLP mode*, the last calibration date can be verified and the factory calibration can be restored.

Last Calibration Date

LAST CALIBRATION DATE

1• Press RANGE/GLP/▲ to enter *GLP mode*. The calibration month and day will appear on the main display and the year on the secondary display.

2• If no calibration was performed, the factory calibration message, "F.CAL" will appear on the main display and the instrument returns to *measurement mode* after three seconds.

FACTORY CALIBRATION RESTORE

Factory Calibration Restore

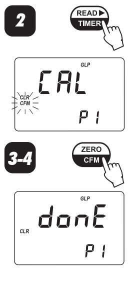
It is possible to delete the calibration and restore factory calibration.

1• Press and hold for three seconds RANGE/GLP/▲ to enter *GLP mode.*

2• Press READ/►/TIMER to enter in the factory calibration restore screen. The instrument asks for confirmation of user calibration delete.

3• Press ZERO/CFM to restore the factory calibration or press RANGE/GLP/▲ again to abort factory calibration restore.

4• The instrument briefly indicates "donE" upon restoration of factory calibration prior to returning to *measurement mode*.



Battery management

To save battery, the instrument shuts down after 10 minutes of non-use in *measurement mode* and after 1 hour of non-use in *calibration mode.*

If a valid measurement was displayed before auto shut off, the value is displayed when the instrument is switched on. The blinking "ZERO" means that a new zero has to be performed.

One fresh battery lasts for around 750 measurements, depending on the light level.

The remaining battery capacity is evaluated at the instrument startup and after each measurement.

The instrument displays a battery indicator with three levels as follows:

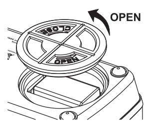
- 3 lines for 100 % capacity
- 2 lines for 66 % capacity
- 1 line for 33 % capacity
- Battery icon blinking if the capacity is under 10 %.

If the battery is empty and accurate measurements can't be taken any more, the instrument shows "dEAd bAtt" and turns off.

To restart the instrument, the battery must be replaced with a fresh one.

To replace the instrument's battery, follow the steps:

- Turn the instrument off by pressing ON/OFF.
- Turn the instrument upside down and remove the battery cover by turning it counterclockwise.



- Extract the battery from its location and replace it with a fresh one.
- Insert back the battery cover and turn it clockwise to close.

Accessories

REAGENT SETS

HI 93701-01	Reagents for 100 Free Chlorine tests
HI 93701-03	Reagents for 300 Free Chlorine tests
HI 95771-01	Reagents for 100 Chlorine Ultra High Range tests
HI 95771-03	Reagents for 300 Chlorine Ultra High Range tests

OTHER ACCESSORIES

HI 96771-11	CAL CHECK™ Standard Cuvettes (1 set)
HI 721310	9V battery (10 pcs)
HI 731318	Cloth for wiping cuvettes (4 pcs)
HI 731331	Glass cuvettes (4 pcs)
HI 731335	Caps for cuvettes (4 pcs)
HI 93703-50	Cuvette cleaning solution (230 mL).

Warranty

HI 96771 is warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to the instructions.

This warranty is limited to repair or replacement free of charge.

Damages due to accident, misuse, tampering or lack of prescribed maintenance are not covered.

If service is required, contact your dealer. If under warranty, report the model number, date of purchase, serial number and the nature of the failure. If the repair is not covered by the warranty, you will be notified of the charges incurred.

If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization Number from the Customer Service Department and then send it with shipment costs prepaid. When shipping any instrument, make sure it is properly packaged for complete protection.

To validate your warranty, fill out and return the enclosed warranty card within 14 days from the date of purchase.

Recommendations for Users

Before using these products, make sure that they are entirely suitable for your specific application and for the environment in which they are used.

Operation of these instruments may cause unacceptable interferences to other electronic equipments, this requiring the operator to take all necessary steps to correct interferences.

Any variation introduced by the user to the supplied equipment may degrade the instrument's EMC performance.

To avoid damages or burns, do not put the instrument in microwave oven. For yours and the instrument safety do not use or store the instrument in hazardous environments.

Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice.

For additional information, contact your dealer or the nearest

Hanna Customer Service Center.

To find the Hanna Office in your area, visit our web site

www.hannainst.com

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